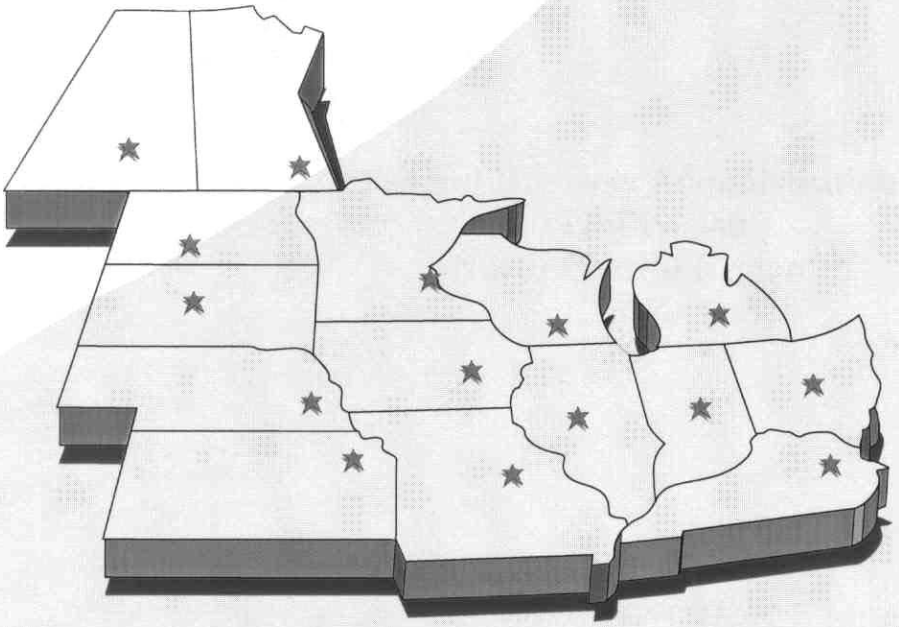
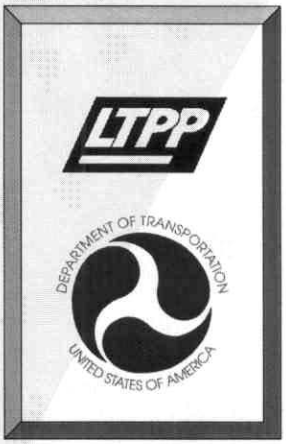
Construction Report for Indiana SPS—9

DTFH61-01-C-00085

June 23, 2003





Submitted by

ERES CONSULTANTS
A Division of Applied Research Associates, Inc.

SPS-9 Construction Report
I-65 Southbound
Tippecanoe County, Indiana
Northeast of Lafayette, Indiana

Sections 180901, 180902, 180904, 180905

Federal Highway Administration
LTPP Division
North Central Region

Report Prepared By:
Brenda B. Mehnert

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Champaign, Illinois 61820

June 2003

Table of Contents

1 Project Overview

One of the goals of the Strategic Highway Research Program (SHRP) Specific Pavement Studies experiment #9 (SPS-9) is the further development and refinement of performance-based specifications for asphalt binder and asphalt-aggregate mixtures. To be successful, it is necessary to validate the binder and mixture properties as important determinants of in-place pavement performance. The evaluation of innovative asphalt pavement materials also requires in-service testing under actual traffic and climate conditions.

The objectives of the SPS-9 study are as follows:

- To compare the SHRP binder selected based on the average maximum and minimum temperatures and the annual precipitation.
- To compare to local agency mix designs.
- Comparisons to an alternate binder selected to evaluate cases of thermal cracking or rutting.
- Comparisons should involve three test sections in the core experiment with the same pavement cross-section.
- Study of additional test sections (supplemental sections), such as stone-matrix asphalt (SMA).

This report summarizes the "as-built" pavement layers of the Indiana SPS-9 site consisting of four SHRP test sections, two of which are Indiana DOT test sections. The rehabilitation of this site occurred in the summer of 1992. The sections were then overlaid in the fall of 1992. Field tests were performed, and laboratory samples were obtained and analyzed at different stages of construction from each test section. All samples were taken from the outer lane.

1.1 Experiment Cell

The Indiana SPS-9 experiment is located in the wet-freeze environmental zone. Annual precipitation at this site is greater than 635 mm and less than 1016 mm. The highest monthly temperature is 80 to 90°F, and the lowest annual temperature is greater than –10 °F.

The existing pavement is composed of about 23.5 cm of continuously reinforced concrete pavement (CRCP) on 16.5 cm of sandy gravel base on a subgrade/embankment of silty, clayey sand. The existing CRCP had numerous low- and medium-severity transverse cracks and was experiencing increasingly frequent punch-outs. The pavement rehabilitation involved full-depth repair patches, tack coat, shoulder restoration, and geo-composite edge drains followed by 12.1 cm of an overlay of a State typical mix or a SHRP Superpave mix. The nearest General Pavement Studies (GPS) site is 185518, located on the northbound lane across from this SPS-9 site.

1.2 Project Location

The Indiana SPS-9 project is located on the southbound lanes of Interstate-65 in Tippecanoe County, Indiana, between State Route 43 and State Route 25. The site starts at mile marker 180.8 and ends at mile marker 176.4, just northeast of Lafayette, Indiana. Attachment A is a project location map.

1.6 Weather Monitoring

There was no automatic weather station (AWS) unit constructed at this site.

1.7 Traffic Monitoring

A weigh-in-motion system (WIM) was already installed in conjunction with the GPS (185518) test section in the spring of 1991. The WIM system was used to classify all individual axles by wheel in all lanes of this section of Interstate 65. The WIM equipment used in this project was a DYNAX unit manufactured by International Road Dynamics Inc. Their address is:

702-43rd St. East
Saskatoon, SK.
CANADA S7K 3T9

Phone: (306) 653-6600

The WIM scale (in each lane) consists of two-bending plates mounted in the pavement that cover half of each lane. The bending plates in each lane are staggered with an inductance loop for vehicle classification between bending plates. The WIM device is located in both directions at milepost 177 on I-65 at the Wabash River Bridge north of State Route 25. The first traffic data was collected in 1991.

1.8 Personnel

North Central Regional Support Contract:

ERES Consultants, a Division of ARA
Tom Wilson, P.E.
Project Manager
505 West University Avenue
Champaign, Illinois 61820 (217) 356-4500

(Regional sub-contractor in 1992)
Soil and Materials Engineers, Inc.
Chuck Gemayel, P.E.
43980 Plymouth Oaks Blvd.
Plymouth, MI 48170-2584 (313) 454-0629

(Regional Engineer in 1992)
Richard C. Ingberg
1983 Sloan Place, Suite 10
St. Paul, MN 55117 (612) 776-2210

Material Testing:

Dave Clauson
Braun Intertec Corporation
6801 Washington Avenue South
P.O. Box 39108
Minneapolis, MN 55439-0108 (612) 941-5600

Cary T. Keller
Soil and Materials Engineers, Inc.
43980 Plymouth Oaks Blvd.
Plymouth, MI 48170-2584

Becky McDaniel
Indiana Department of Transportation
Division of Research
1205 Montgomery Street
P.O. Box 2279
West Lafayette, IN 47906 (317) 463-1521

Leonard Ducker
McConnaughay Technologies, Inc.
Purdue Research Park
3080 Kent Ave.
P. O. Box 2156
West Lafayette, IN 47906 (317) 497-9545

Field Sampling and Testing:

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Soils and Materials Engineers, Inc.
43980 Plymouth Oaks Blvd.
Plymouth, IN 48170 (313) 454-9900

Becky McDaniel
Indiana Department of Transportation
Division of Research
1205 Montgomery Street
P.O. Box 2279
West Lafayette, IN 47906 (317) 463-1521

Design Team:

Gerry Huber
Asphalt Institute
Research Park Drive
P.O. Box 14052
Lexington, KY 40512-4052 (606) 288-4960

Chuck Gemayel
Soils and Materials Engineers, Inc.
43980 Plymouth Oaks Blvd.
Plymouth, Indiana 48170 (313) 454-9900

Dave Clauson
Braun Intertec Corporation
6801 Washington Avenue South
P.O. Box 39108
Minneapolis, MN 55439-0108 (612) 941-5600

Wes Shaw, Project Engineer
Indiana Department of Transportation
Division of Research
1205 Montgomery Street
P.O. Box 2279
West Lafayette, IN 47906 (317) 463-1521

LTPP Design Review:

John Miller
PCS/LAW
A Division of Law Engineering and Environmental Services, Inc.
114 Town Park Drive
Kennesaw, GA 30144 (301) 210-4105

Contractors:

Mid-State Paving (subcontractor for PCC patches)
P.O. Box 947
Jeffersonville, IN 47131-0947 (812) 282-4633

Tom Buck
Keiser and Keiser Contracting
3425 O'Farrell Rd.
Lafayette, IN 47904 (317) 447-2324 or (317) 447-2329

1.9 Known Deviations from Guidelines

Attachment E contains project deviation reports completed after construction.

1.10 Summary of Key Construction Equipment

The construction equipment that was used to place the asphalt concrete overlay included the following:

Barber Greene BC-60 batch plant
Blaw-Knox PF-180H paver
Ingram steel wheeled tandem roller
10-ton Ingersoll-Rand DA-50 dual drum vibratory roller

1.11 References

Summaries from preliminary construction reports by Cary T. Keller (Soils and Materials, Inc. from 1994) and Ronald W. Brenke (FHWA in the Indiana Division) were used to complete this construction report. Although construction occurred in 1992, a final construction report was never submitted.

2 Project Details

Rehabilitation of 180900 began in late April to early May 1992 with work on bridges and approaches and construction of the full-depth patches. Paving of the State test sections began on September 23, 1992, and was completed on September 27, 1992. Paving of the SHRP Superpave mixes began on September 23, 1992, and was completed on September 28, 1992. The road was opened to traffic in November 1992.

In the spring of 1993, rehabilitation of the northbound lanes began and traffic was diverted from the northbound lanes to the southbound lanes, where bidirectional traffic was maintained using concrete median barriers to separate the traffic flows. The construction on the northbound lanes was completed in the fall of 1993 and traffic flows resumed in the original directions.

The Indiana SPS-9 test site consists of four test sections. Two of the sections had Superpave mix design and two had State mix design for the asphalt overlay. Attachment B shows the layout of the test sections. This attachment also contains plan figures for each test section.

2.1 Design Features

All of the sections consisted of three courses of an asphalt overlay. The SHRP sections consisted of 5 HV Base, 9 HV binder and 11 HV surface, all designed to SHRP specifications. AC 20 is the asphalt binder that was used for all of the pavement sections. All sections had AC overlays designed with the Marshall Mix procedures, where quality assurance (QA) practices were used. Table 3 summarizes the layer thickness for each section. Subsurface edge drains were located in all the sections.

Table 3. Summary of material thickness for each section.

Test Section Number	AC Thickness (mm) (Surface)	AC Material and Thickness (mm) (Binder)	AC Material and Thickness (mm) (Base)
180901*	30.5	45.7	58.4
180904*	27.9	35.6	76.2
180902	25.4	40.6	76.2
180905	27.9	43.2	66.0

* State mix design

The SHRP and INDOT mixtures were similar, as shown in table 4. The main differences between the two include the use of 100% crushed slag coarse aggregate in the SHRP surface mix and a 50-50 blend of crushed dolomite and crushed slag coarse aggregate in the INDOT surface. Also, manufactured or blended sands were used in the SHRP binder and surface, versus 100% natural sand in the INDOT binder and surface, and the INDOT binder and surface mixtures had a somewhat finer gradation.

Table 4. Comparison of mixtures for the SPS-9 project in Indiana.

	Base		Binder		Surface	
	INDOT	SHRP	INDOT	SHRP	INDOT	SHRP
Coarse Agg.	100 % Cr. Stone	100% Cr. Stone	100% Cr. Stone	100% Cr. Stone	50% Cr. Slag 50% Cr. Stone	100% Cr. Stone
Fine Agg.	100% Nat. Sand	100% Nat. Sand	100% Nat. Sand	44% Rock Sand 56% Cr. Stone	100% Nat. Sand	44% Rock Sand 56% Cr. Stone
1.5"	100%	100%	100%	100%	100%	100%
1"	96.4	95.3	100%	100%	100%	100%
¾"	89.6	86.8	100%	100%	100%	100%
½"	67.5	65.7	84	82.4	100%	100%
3/8"		52.5		65.4		93.2
No. 4	34.6	30.5	44	42.1	60.0	60.0
No. 8		21.3		23.5	38.9	38.9
No. 16		17.3		14.4		26.4
No. 30	15.0	13.3	19.9	11.8	27.0	20.4
No. 50		7.6		10.1		14.2
No. 100		3.8		6.5		7.7
No. 200	2.9	3	2	4.3	2.2	4.9
Design AC%	4.5	4.5	4.6	5.5	6.4	6.5
Design Air Voids	5	4	6.1	4.0	6.2	4.1
Design Stab.	2162		2011		2211	
Design Flow	8.33		7.3		7.7	
Mean AC	4.4	4.5	4.6	5.5	5.8	6.1
Mean Voids	4.1	4.0	4.5	4.0	5	4.1
Mean VMA	13.2	13.3	14.9	15.5	15.9	16.2

**AC-20 used for both mix designs.

2.2 Rehabilitation

Rehabilitation consisted of constructing full-depth doweled patches at high-severity transverse cracks and punch-out areas to be followed by 121 mm of asphalt concrete. On average, there were about two patches within each of the test sections. New geo-composite edge drains were constructed to replace the existing underdrain system. The shoulders were also overlaid with about 121 mm of asphalt concrete.

2.3 Material Sampling and Testing

Pre- and post-material sampling and field-testing locations for each layer are given in attachment C. The initial field layout and drilling and sampling information is included in the attachment. During construction, the layout of the test sections changed and is noted in the attachment. Long Term Pavement Performance (LTPP) sampling and field testing procedures have been developed specifically for the SHRP program. When this project started, forms for an SPS-6 study were used, since the SPS-9 forms had not been completed. Falling Weight Deflectometer (FWD) testing and profilometer measurements were also performed. All activities were performed in accordance with these guidelines unless noted in attachment E.

Bulk samples of the aggregate and asphalt cement from the mixes were sent to the SHRP Materials Reference Library (MRL) in Austin, TX. Bulk samples of the asphalt concrete mixes were taken at the batch plant for both the MRL and for laboratory testing by INDOT.

2.4 Construction Activities

This SPS-9 project involved the rehabilitation of the existing 229 mm CRCP and overlaying with varying thickness of Superpave material and Indiana DOT specified material, as shown in table 3. The rehabilitation included full-depth repair, geo-composite edge drains, restoring the AC shoulder, and applying a tack coat (CMS-2) before the overlay.

Asphalt Concrete Plant

The asphalt concrete plant used was a batch type mix from Keiser & Keiser, Inc. Plant #3 located 12.6 km or 15 minutes from the test site. The mixes were produced in a Barber Greene BC-60 batch plant that has a batch size of 3 tons.

Asphalt Paving

A Blaw-Knox PF-180H paver laid the mix with a single pass laydown width of approximately 3.8 meters. The asphalt overlay was then compacted with an Ingram Steel Wheeled Tandem Roller for the breakdown, a 10-ton Ingersoll-Rand DA-50 Dual Drum Vibratory roller for the intermediate rolling, and the Double Drum roller operated in the static mode for the finish rolling.

The longitudinal surface joint was located between the lanes for the four test sections.

2.5 Post-Construction Testing and Condition

Post-construction coring of the surface was also performed. This coring included samples for pavement testing and asphalt research testing. The samples, which were taken for the asphalt research program, are stored in the INDOT Dept. of Research in West Lafayette, Indiana, under the supervision of Ms. Becky McDaniel.

In February 1994, Soil and Materials Engineers, Inc. performed a manual distress survey and recorded transverse profiles using the Dipstick profiler. They found the sections to be in very good condition. An average of 175 m of low-severity longitudinal cracking at the paving joints was observed for the test sections. Some low-severity longitudinal cracking was also observed in the paved shoulder overlying the rehabilitated edge drains, and there was a noticeable depression in the pavement in this area. This depression or light rutting is attributed to post-construction compaction from vehicular traffic that was rerouted during the summer of 1993 when the southbound lanes were reconstructed.

There were a total of 24 transverse cracks within the 4 test sections, which appear to be reflected from patches, or cracks in the underlying pavement. The majority of the transverse cracks were low severity, but there were two at medium severity and one at high severity. The longitudinal and transverse cracking did not appear to be related to the asphalt concrete mix placed since the quantity and severity of the cracking was evenly distributed among all the test sections.

Attachment A

Project Location

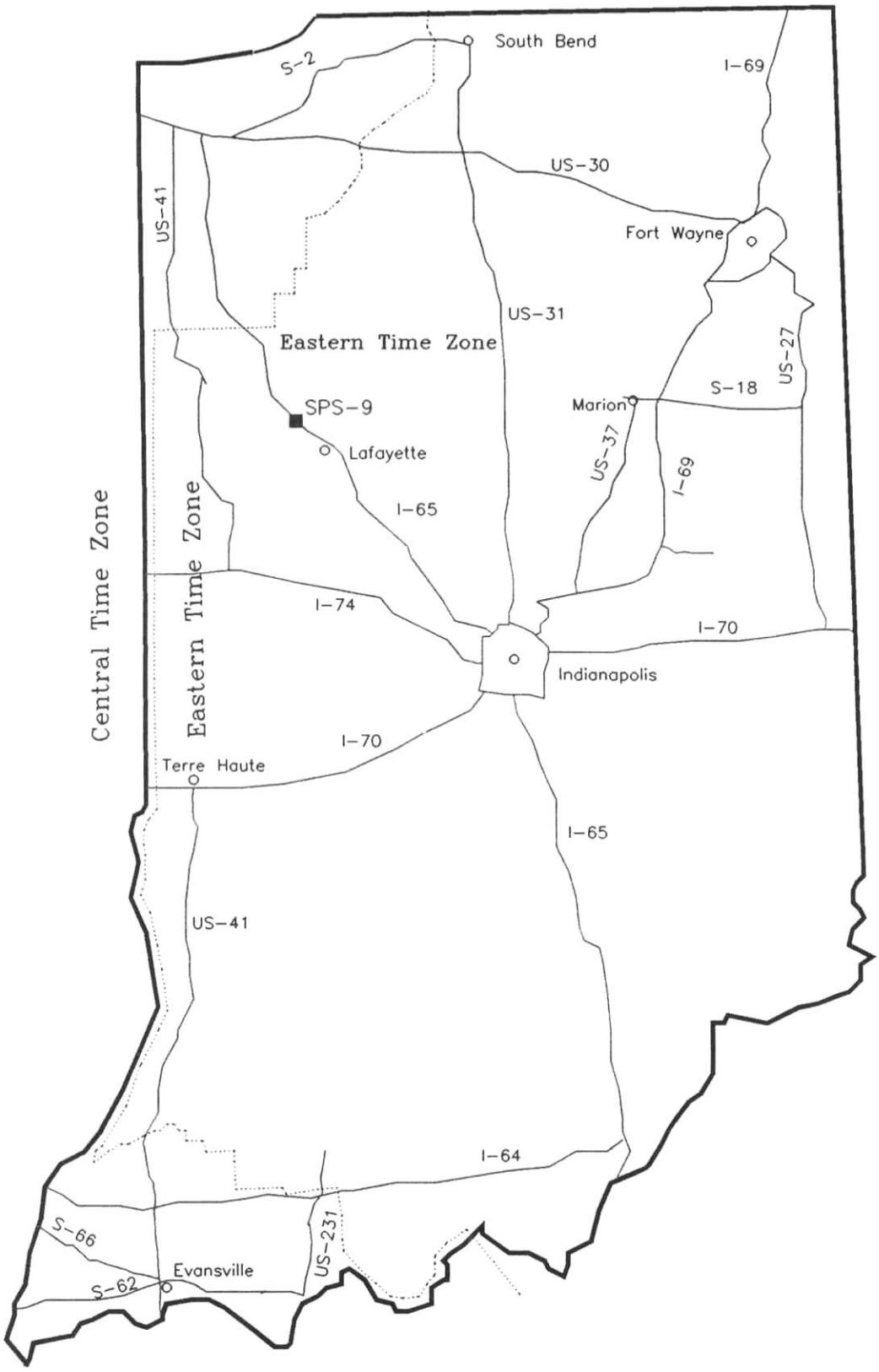
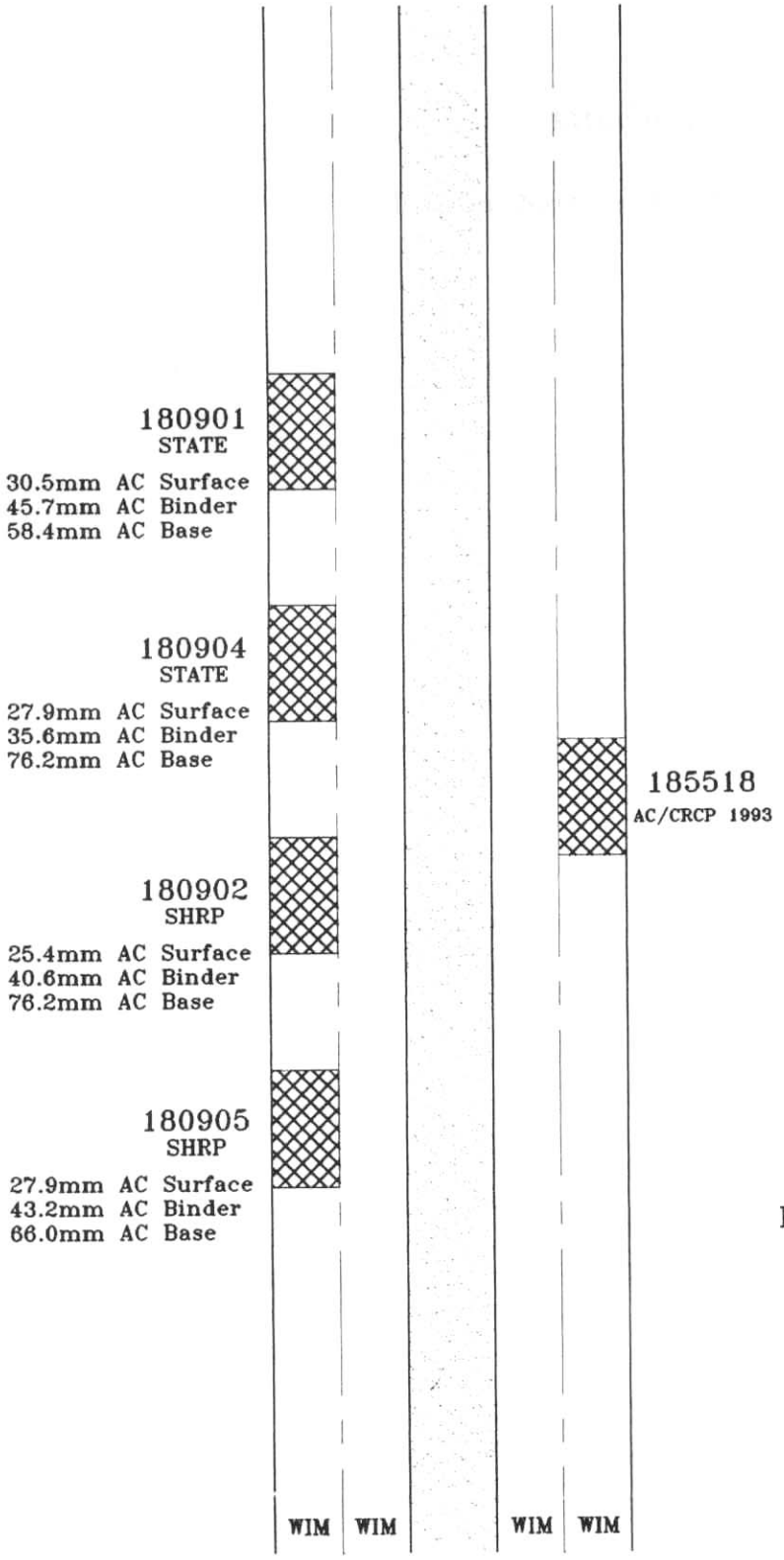


Figure A-1. General project location for 180900.

Attachment B

Site Layout



Revised 05-29-03

Figure B-1. Indiana SPS-9 site layout.

Attachment C

Material Sampling and Testing Plan

soil and materials engineers, inc.

43980 Plymouth Oaks Blvd. Plymouth, MI 48170 (313) 454-9900 FAX (313) 454-0629

May 19, 1992

Mr. Yi Jiang
Special Projects Engineer
Division of Research
Indiana Dept. of Transportation
P.O. Box 2279
West Lafayette, IN 47906

Re: Indiana SPS-9 Laboratory Testing
SME Project No. P11500-6

Dear Mr. Yiang:

The fieldwork for the pre-construction materials sampling and testing has recently been completed and the soil samples and cores were taken to your laboratory for testing. This letter will detail some minor field changes in the sampling locations and provide you with the required sample designations for laboratory testing.

Figures 1 through 5 present the test section layout, sampling areas, and as-sampled locations. There were a few changes in the as-sampled locations to avoid non-representative sample areas. Upon completion of the fieldwork a copy of the Project Site Report which included all of the pertinent information relative to the field sampling and testing was given to your site representative, Mr. Travis Louvorn, for your use. Revised copies of Tables 1 and 2 which present the sample designations and the laboratory testing plans are included for your use also.

Should you have any questions concerning these laboratory testing plans, please feel free to call our office.

Very truly yours,

SOIL AND MATERIALS ENGINEERS, INC.

Cary T. Keller
Staff Engineer
N.C.R.C.O.
SHRP

Chuck A. Gemayel, P.E.
Project Engineer
N.C.R.C.O.
SHRP

pc: Gene Skok, BIP
Ron Urbach, BIP

INDIANA SPS-9

SITE LAYOUT AND PRE-CONSTRUCTION

SAMPLING AND FIELD TESTING PLAN

I-65 SOUTHBOUND
TIPPECANOE COUNTY

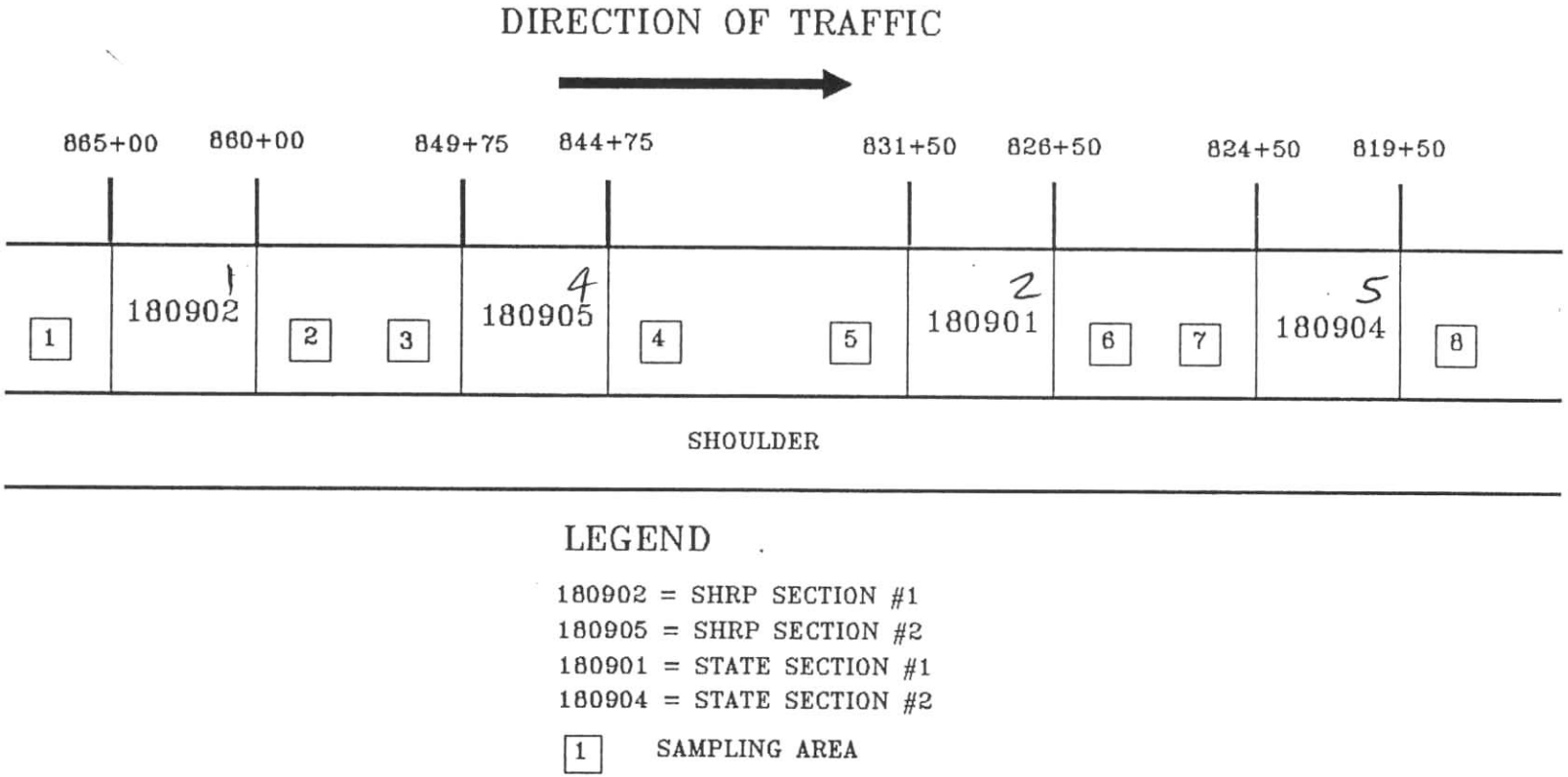


Figure 1. Site Layout and Sampling Locations

SPS-9 INDIANA

AS SAMPLED LOCATION DIAGRAM

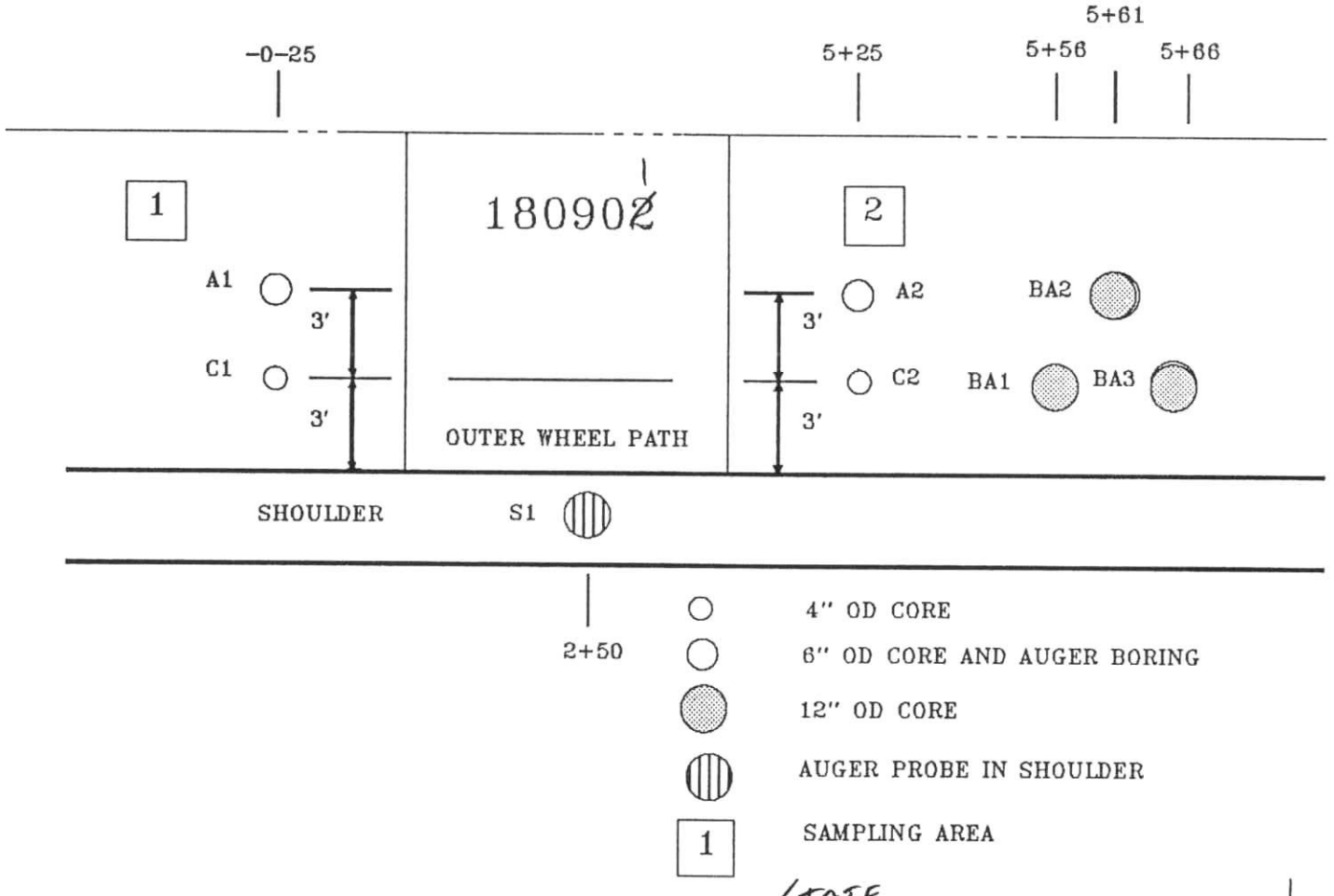


Figure 2. Sampling Plan for ~~SHRP~~ STATE Section 180902

SPS-9 INDIANA

AS SAMPLED LOCATION DIAGRAM

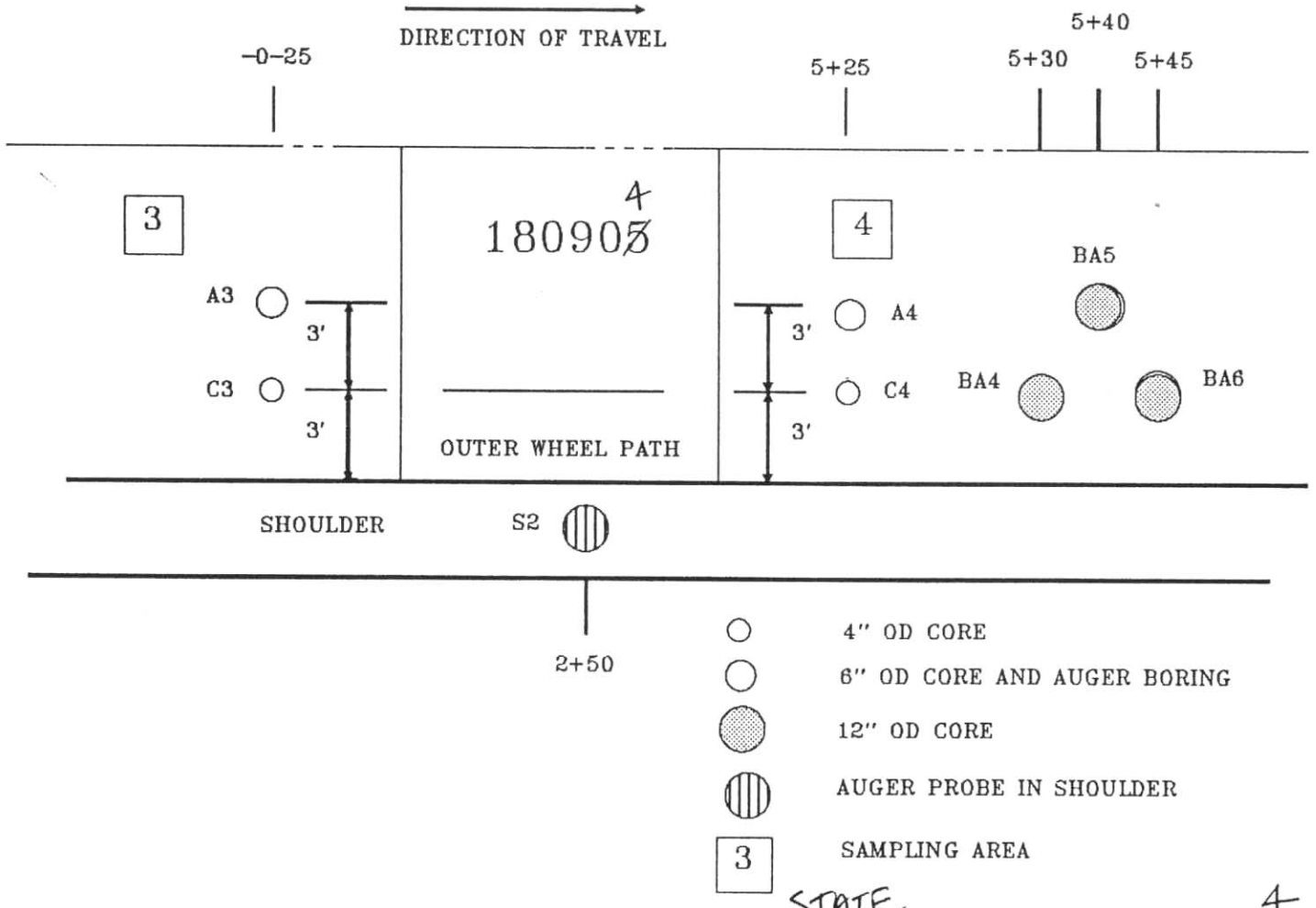


Figure 3. Sampling Plan for ~~SHRP~~ STATE Section 180905 4

SPS-9 INDIANA

AS SAMPLED LOCATION DIAGRAM

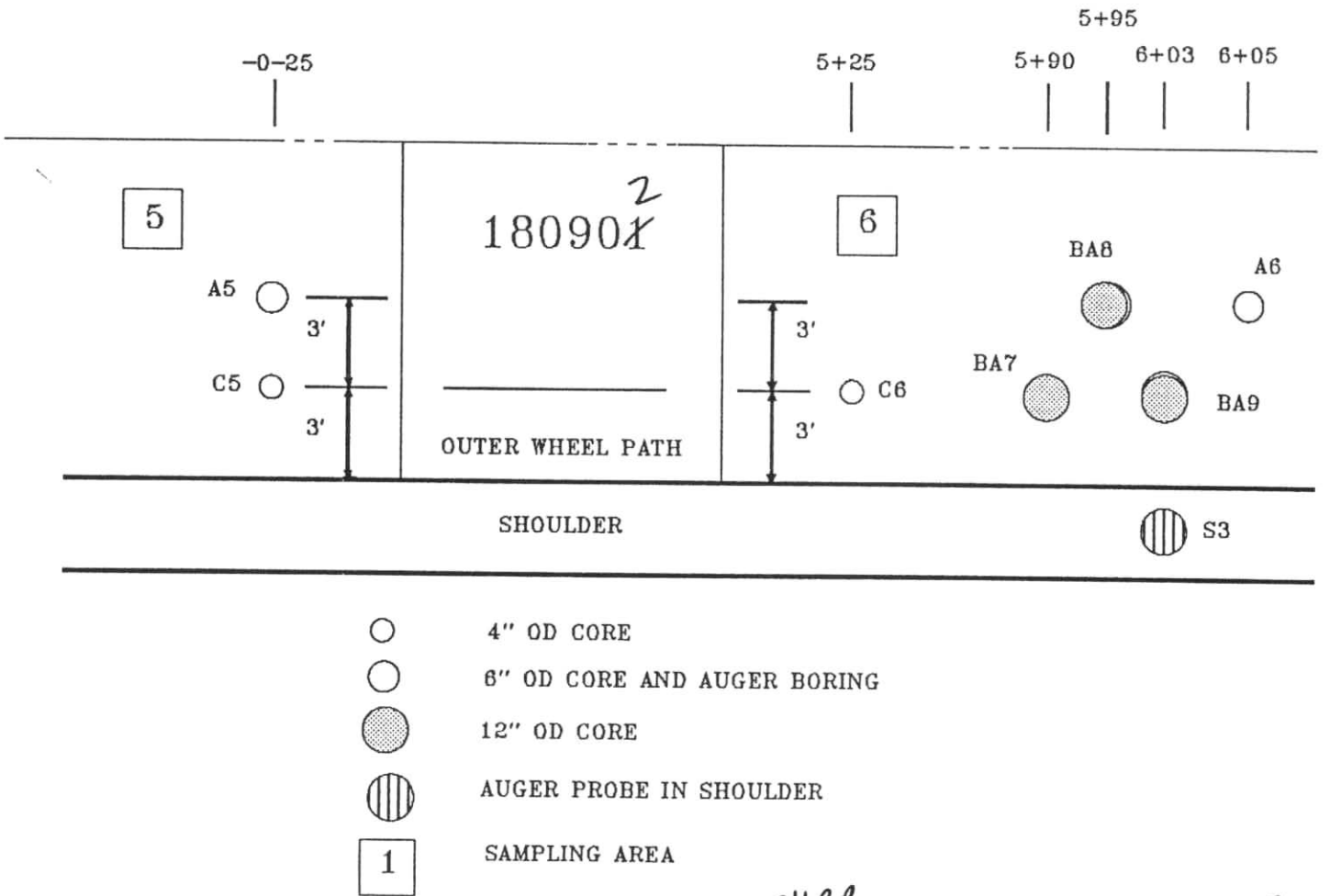


Figure 4. Sampling Plan for ~~State~~ SHRP Section 18090 2

SPS-9 INDIANA

AS SAMPLED LOCATION DIAGRAM

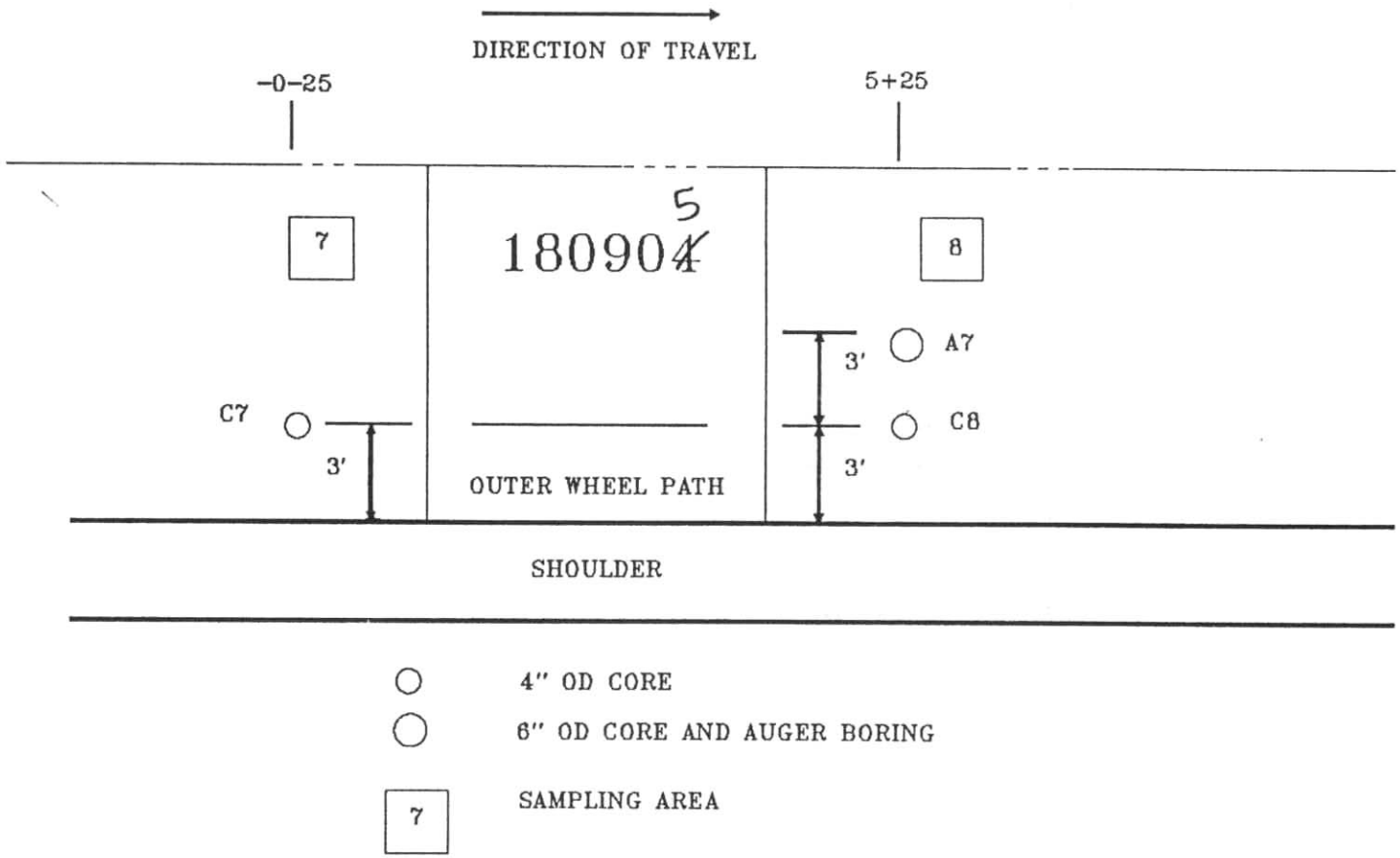


Figure 5. Sampling Plan for ~~State~~ SHRP Section 180905

INDIANA SPS-9

TABLE 1: AS-SAMPLED PRECONSTRUCTION MATERIAL SAMPLING AND FIELD TESTING

Material and Sample Description	Number of Samples	Sample Type Designation
1. PCC (Original Layer)		
Coring – 4″ diameter cores	8	C1 – C8
Coring – 6″ diameter cores	7	A1 – A7
Coring – 12″ diameter cores	9	BA1 – BA9
2. Unbound Base Layer		
Augering 6″ diameter holes	7	A1 – A7
Bulk sampling in 12″ diameter holes	9	BA1 – BA9
Moisture content samples	3	BA1 – BA9
3. Subgrade		
Splitspoon sampling (2 per hole)	14	A1 – A7
Bulk sampling in 12″ diameter holes	9	BA1 – BA9
Moisture content samples	9	BA1 – BA9
4. Shoulder Auger Probes	3	S1 – S3

INDIANA SPS-9

TABLE 2. PRE-CONSTRUCTION LABORATORY TESTING PLANS

MATERIAL TYPE AND PROPERTIES	SHRP DESIGNATION	SHRP PROTOCOL	TESTS PER LAYER	MATERIAL SOURCE (1) TEST LOCATIONS
I. PORTLAND CEMENT CONCRETE				
Compressive Strength	PC01	P61	3	C1 C5 C8
Splitting Tensile Strength	PC02	P62	3	C2 C4 C6 A1 A3 A4 A6
PCC Coefficient of Thermal Expansion	PC03	P63	3	A2 A5 A7
Static Modulus of Elasticity	PC04	P64	2	C3 C7
PCC Unit Weight	PC05	P65	4	C1 C3 C5 C7
Core Examination/Thickness	PC06	P66	15	C1 – C8, A1 – A7
II. UNBOUND GRANULAR BASE				
Particle Size Analysis	UG01	P41	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Sieve Analysis (washed)	UG02	P41	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Atterberg Limits	UG04	P43	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Moisture-Density Relations	UG05	P44	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Resilient Modulus	UG07	P46	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Classification	UF08	P47	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Permeability	UF09	P48	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Natural Moisture Content	UF10	P49	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
III. SUBGRADE				
Sieve Analysis	SS01	P51	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Hydrometer to 0.001 mm	SS02	P42	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Atterberg Limits	SS03	P43	3	[BA1 – BA3], [BA4 – BA6], [BA7 – BA9]
Classification	SS04	P52	3	[BA1 – BA3], [BA4 – BA6]
Moisture Density Relations	SS05	P55	3	[BA1 – BA3], [BA4 – BA6]
Resilient Modulus	SS07	P46	7	Use remolded bulk samples – (no thinwall tube samples taken)
~~Unit Weight~~	~~SS08~~	~~P56~~	~~8~~	~~[BA1 – BA3], [BA4 – BA6]~~
Natural Moisture Content	SS09	P49	8	[BA1 – BA3], [BA4 – BA6]
~~Depth of Rigid Layer~~			~~3~~	~~S1 – S3~~

NOTE (1): SAMPLES WITHIN BRACKETS ARE FROM THE SAME SAMPLING LOCATION

soil and materials engineers, inc.

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Kenneth W. Kramer, PE
Richard O. Anderson, PE
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Frank A. Henderson, PG
Edward S. Lindow, PE
Robert C. Rabeler, PE

Jerry B. Givens, PE
Larry P. Jodoin, PE
Starr D. Kohn, PhD, PE
Gerard P. Madaj, PE
Donald C. Tomplin, PE
Francis F. Widrig, PE
Timothy H. Bedenis, PE
J. William Coberly
Frank D. Grefsheim, PE
Bruce D. Hulman, PE, PG
Cheryl Kohres-Dietrich
Paul C. Larsen, PE
Timothy J. Mitchell, PE
T. Thomas Okasinski, PE
Christine R. Rollinson
John C. Zarzecki, CWI

November 20, 1992

Mr. Yi Jiang
Special Projects Engineer
Division of Research
Indiana Dept. of Transportation
P.O. Box 2279
West Lafayette, IN 47906

Re: Indiana SPS-9 Post-Construction Testing
SME Project No. P18400-A

Dear Mr. Jiang:

We have assembled the post-construction materials sampling and testing plan for the recently completed asphalt concrete overlays at your SPS-9 site. There are two types of testing activities: Pavement materials/performance testing and asphalt mixture testing. Pavement testing includes tests intended for material characterization and pavement performance evaluation. Asphalt testing includes tests intended for asphalt research and validation of the SHRP performance-based specifications.

Pavement testing field activities will include obtaining twenty-eight (28) four-inch diameter asphalt concrete cores of the overlay. Pavement testing Figures 1 - 5 provide the site layout and sample locations and designations for the cores. Please note that the numbering of the test sections has changed since the site was initially field verified. This was done to facilitate construction at the site. It will be necessary for you to utilize the new test section numbering for both the post-construction materials sampling and testing and the pre-construction sampling and testing. This will require renumbering the samples from the pre-construction phase. You should already have a copy of the previous test section numbering scheme.

Pavement testing laboratory activities are outlined in Table 1: SPS-9 Laboratory Testing Plans - Asphalt Mixes for Overlays on I-65. The tests are essentially the same as those required for the SPS-6 experiment.

Asphalt testing field activities will include obtaining eighty-eight (88) four-inch diameter asphalt concrete cores of the overlay at various times during the life of the pavement. Twenty-two (22) cores will be taken from each test section over a 20 feet long pavement section at each of the ten (10) sampling dates starting immediately after construction and continuing to 14 years after construction. Half of these cores will be extracted from the wheel path and the other half from between wheel paths. Figures 1 - 6 provide the site layout and sample locations for the cores.

Asphalt testing laboratory activities will be performed under a contract through SHRP Asphalt Research. At this time, sample storage will be your responsibility as the contracts for the testing have not been finalized.

During the field sampling activities we will provide field personnel to assist with the necessary data collection.

Should you have any questions concerning these post-construction materials sampling and testing plans, please feel free to call our office.

Very truly yours,

SOIL AND MATERIALS ENGINEERS, INC.

Cary T. Keller
Staff Engineer

Chuck A. Gemayel, P.E.
Project Engineer

enclosures

pc: Gene Skok, BIP w/o enclosures
Ron Urbach, BIP w/ enclosures
Dick Ingberg, FHWA w/o enclosures
Ron Cominsky, SHRP Univ. of Texas w/ enclosures

INDIANA SPS-9

November 17, 1992

SITE LAYOUT AND POST-CONSTRUCTION SAMPLING AND FIELD TESTING PLAN PAVEMENT TESTING

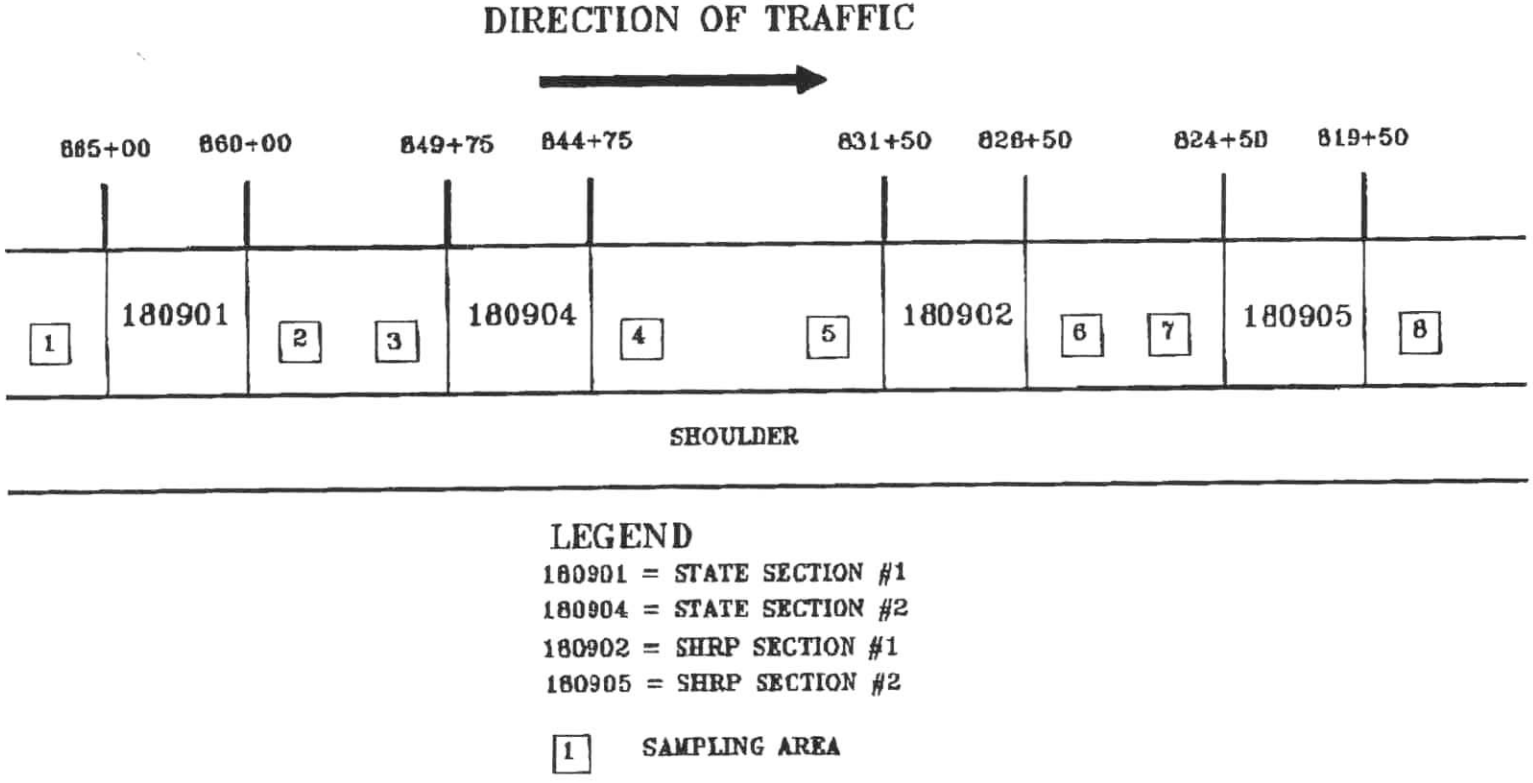


Figure 1. Site Layout and Sampling Locations

SPS-9 INDIANA

POST-CONSTRUCTION SAMPLING AND TESTING

PAVEMENT TESTING

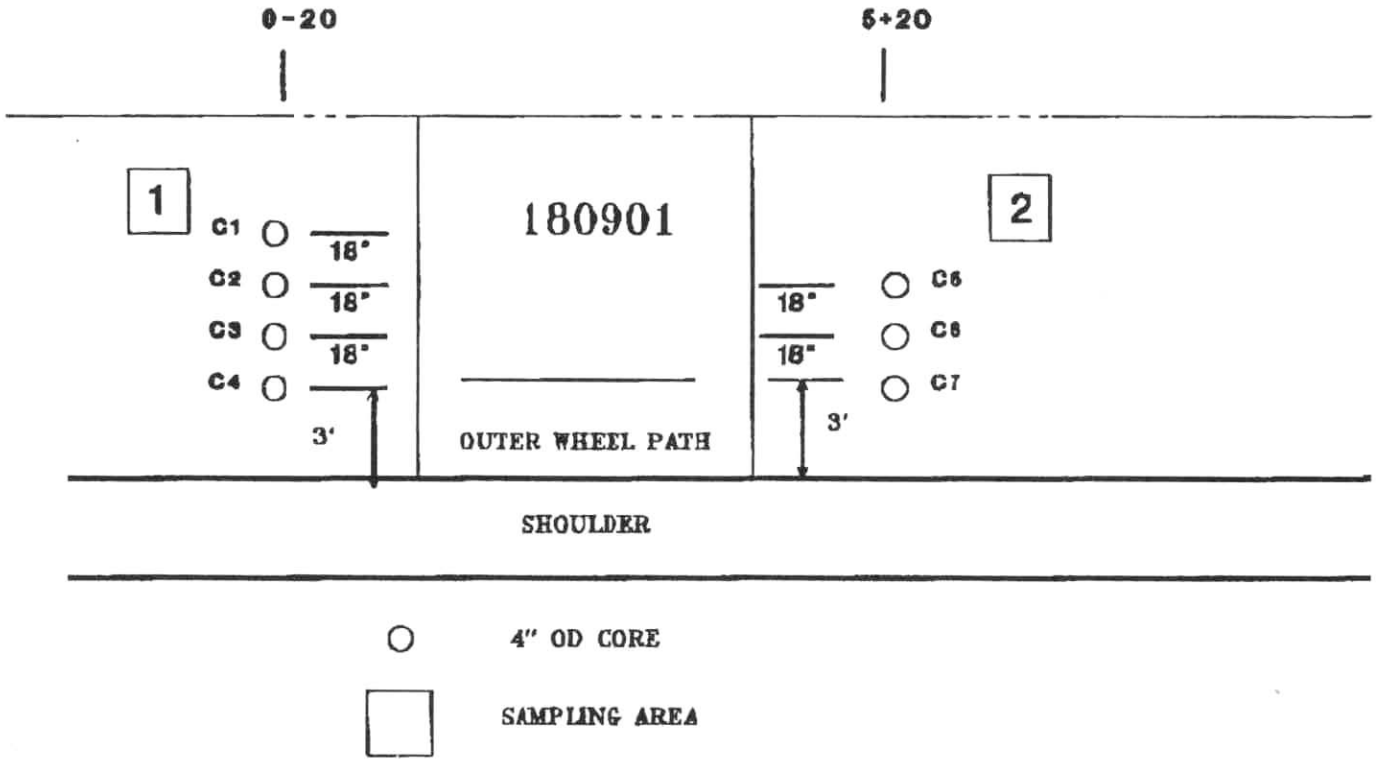


Figure 2. Sampling Plan for 180901

SPS-9 INDIANA

POST-CONSTRUCTION SAMPLING AND TESTING
PAVEMENT TESTING

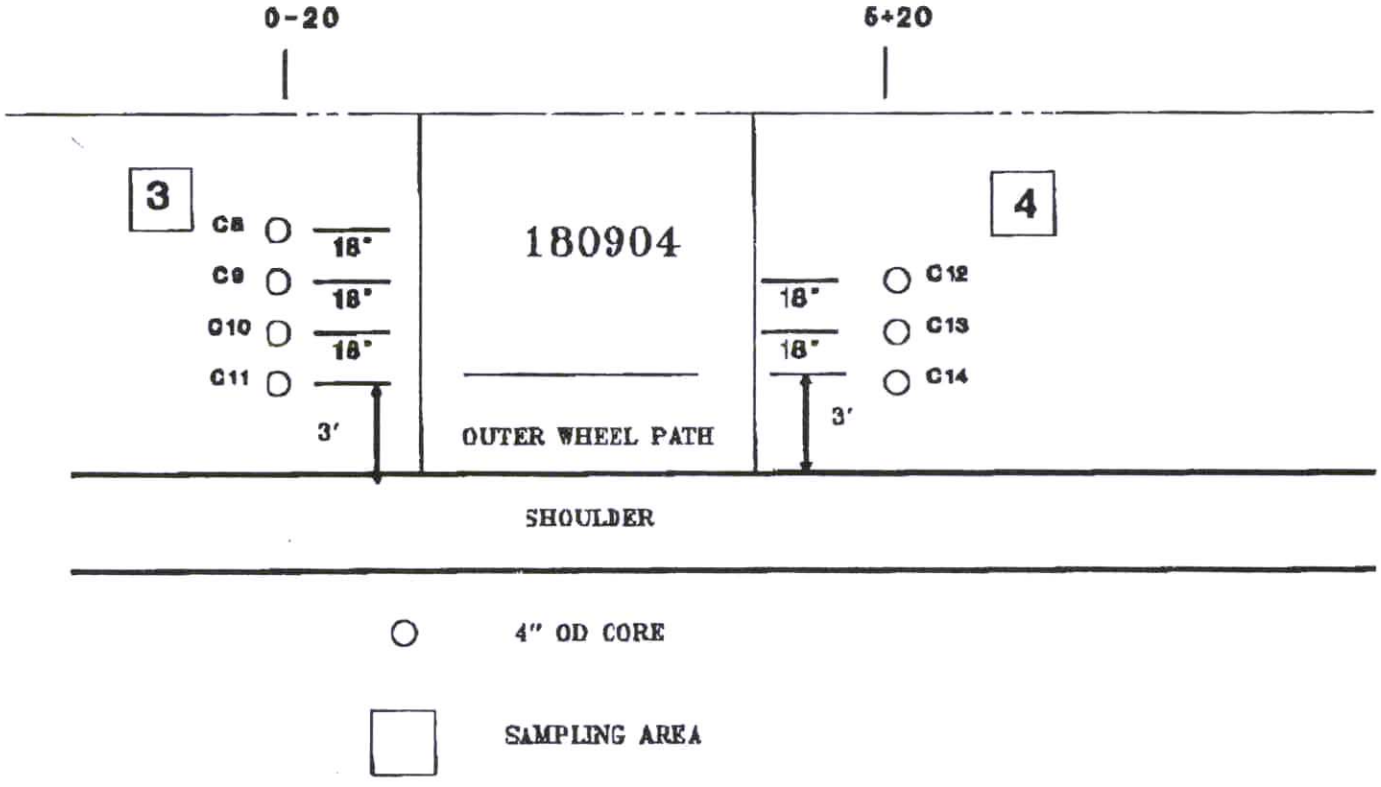


Figure 3. Sampling Plan for 180904

SPS-9 INDIANA

POST-CONSTRUCTION SAMPLING AND TESTING
PAVEMENT TESTING

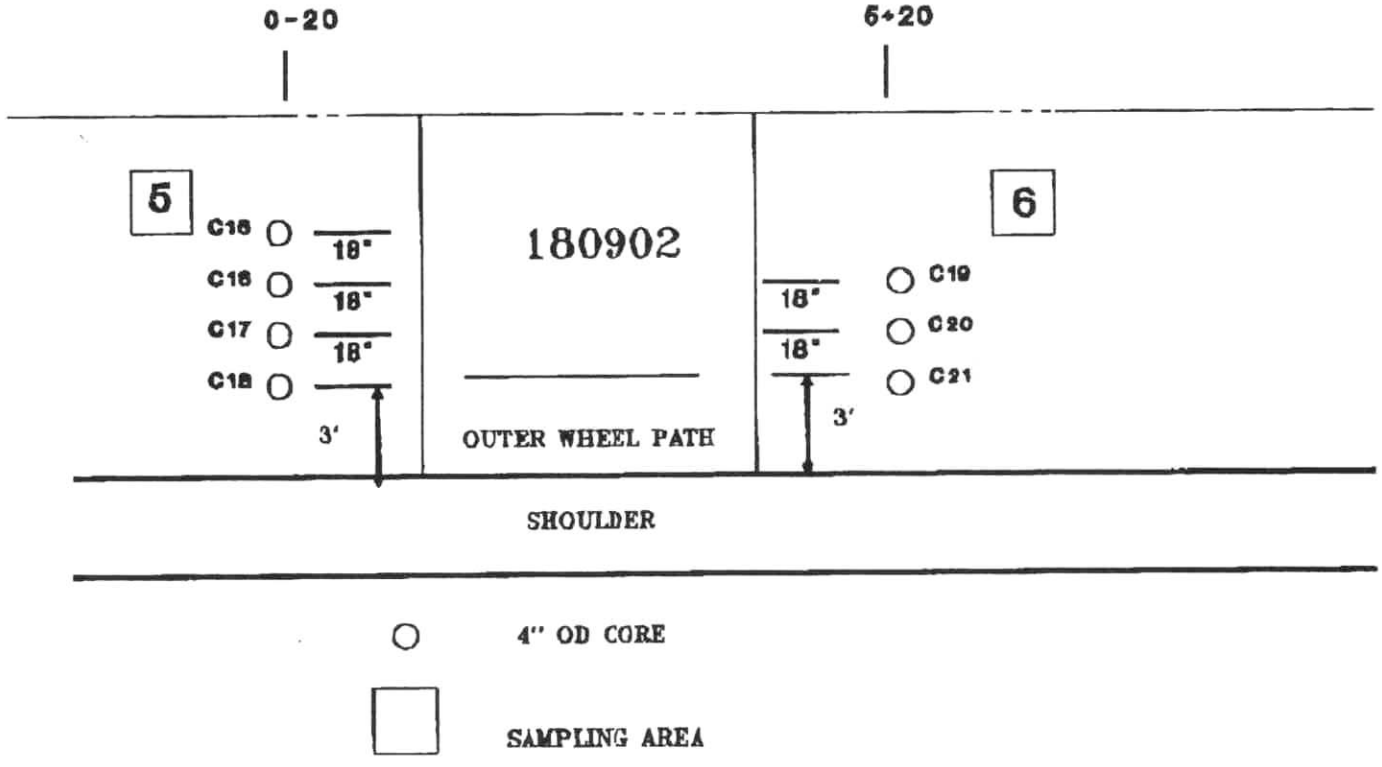


Figure 4. Sampling Plan for 180902

SPS-9 INDIANA

POST-CONSTRUCTION SAMPLING AND TESTING
PAVEMENT TESTING

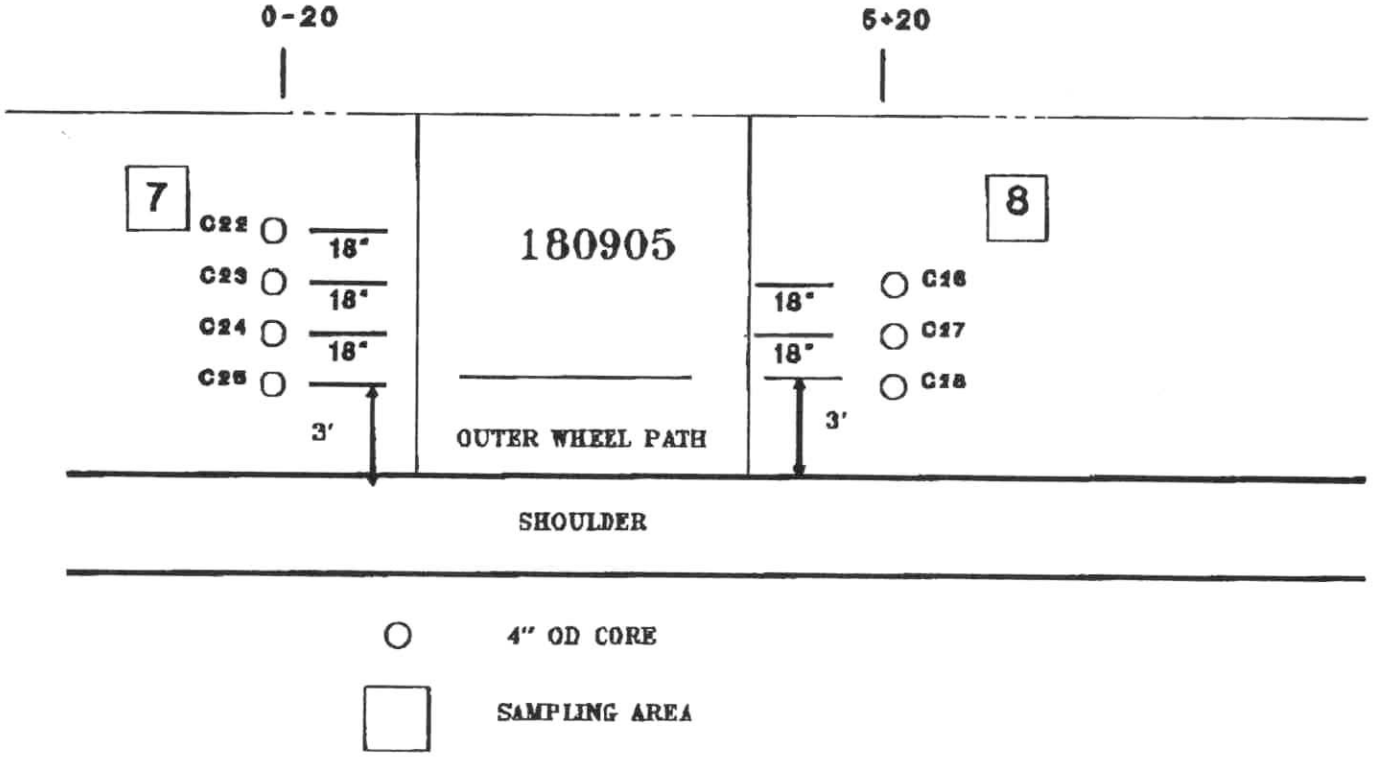


Figure 5. Sampling Plan for 180905

TABLE 1

SPS–9 LABORATORY TESTING PLANS – ASPHALT MIXES FOR OVERLAYS ON I–65

Material type and Properties	SHRP Test	SHRP Protocol	Number of Tests	Samples
NEW ASPHALTIC CONCRETE				
Core examination/thickness	AC01	P01	28	C1–C28
Bulk specific gravity	AC02	P02	28	C1–C28
Maximum specific gravity	AC03	P03	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)
Asphalt content (extraction)	AC04	P04	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)
Moisture susceptibility	AC05	P05	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)
Creep compliance	AC06	P06	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)
Resilient Modulus	AC07	P07	8 (SHRP)	C1,C4,C5,C7,C8,C11,C12,C14
			8 (STATE)	C15,C18,C19,C21,C22,C25,C26,C28
Tensile strength	AC07	P07	From resiliert modulus	
AGGREGATES (Extracted from NEW asphalt concrete)				
Bulk specific gravity				
Coarse agg.	AG01	P11	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)
Fine agg.	AG02	P12	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)
Type and classification	AG03	P13	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)
Gradation of aggregate	AG04	P14	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)
NAA Test for fine aggregate particle shape	AC05	P14A	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)
Coarse agg. patticle shape	AG06	P14B	2	BV1–2 (SHRP)
			2	BV3–4 (STATE)

TABLE 1
continued
SPS-9 LABORATORY TESTING PLANS – ASPHALT MIXES FOR OVERLAYS ON I-65

Material type and Properties	SHRP Test	SHRP Protocol	Number of Tests	Samples
ASPHALT CEMENT (Recovered from NEW asphalt concrete)				
Penetration 50°F, 77°F, 90°F	AE02	P22	2	BV1-2 (SHRP)
			2	BV3-4 (STATE)
Specific gravity (60°F)	AE03	P23	2	BV1-2 (SHRP)
			2	BV3-4 (STATE)
Viscosity 77°F	AE04	P24	2	BV1-2 (SHRP)
			2	BV3-4 (STATE)
Viscosity 140°F, 275°F	AE05	P25	2	BV1-2 (SHRP)
			2	BV3-4 (STATE)

INDIANA SPS-9

November 17, 1992

SITE LAYOUT AND POST-CONSTRUCTION SAMPLING AND ASPHALT TESTING PLAN

I-65 SOUTHBOUND
TIPPECANOE COUNTY

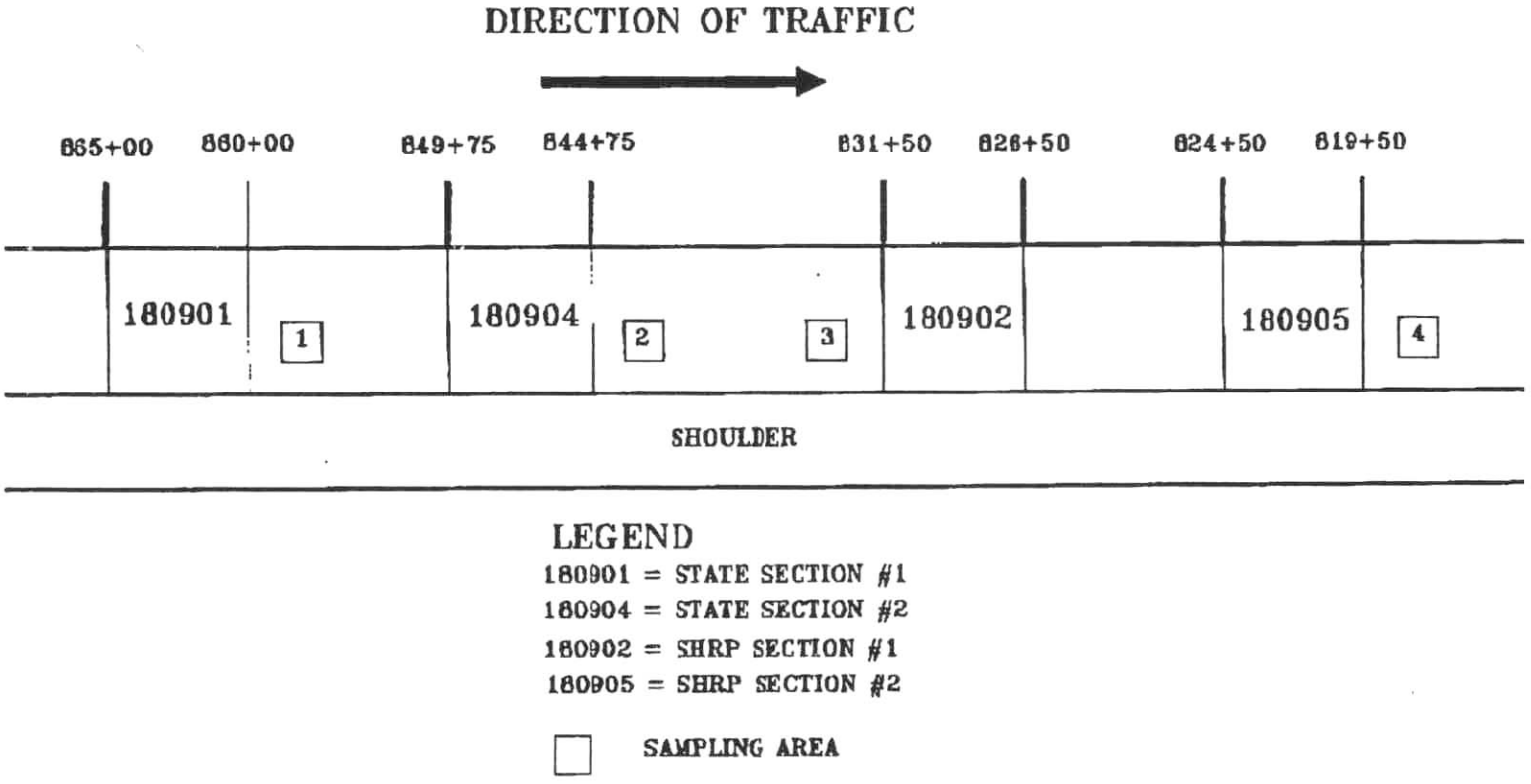
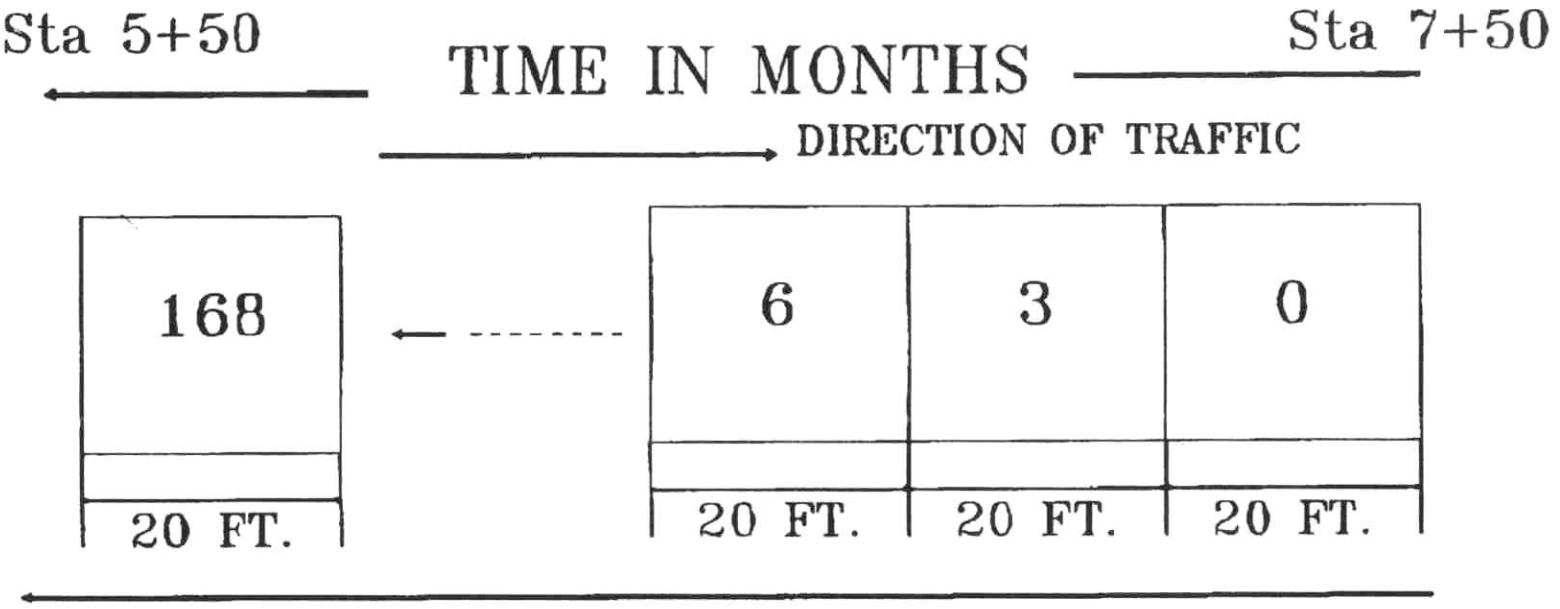


Fig. 1A Site Layout and Asphalt Testing Plan

SAMPLING TIMETABLE

ASPHALT TESTING: 180901, 180904, 180905



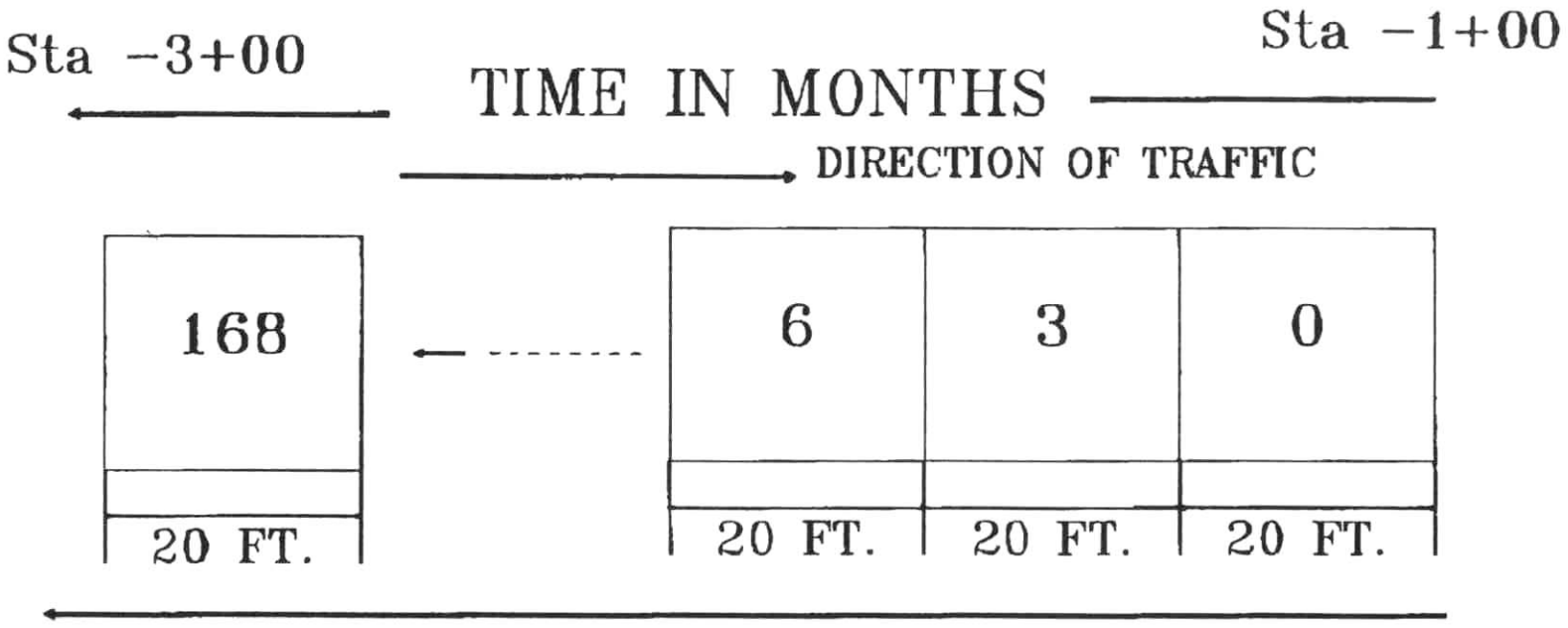
10 SAMPLING DATES @ 20 FT.
200 FT.

Note: Sampling begins 250 ft. south of test section and proceeds north toward end of test section. Stationing shown is relative to test section stationing.

Fig. 1B Sampling Locations and Timetable

SAMPLING TIMETABLE

ASPHALT TESTING: 180902



10 SAMPLING DATES @ 20 FT.
200 FT.

Note: Sampling begins 100 ft. north of test section and proceeds north away from test section. Stationing shown is relative to test section stationing.

Fig. 1C Sampling Locations and Timetable

TYPICAL PAVEMENT SAMPLING PLAN

ASPHALT TESTING

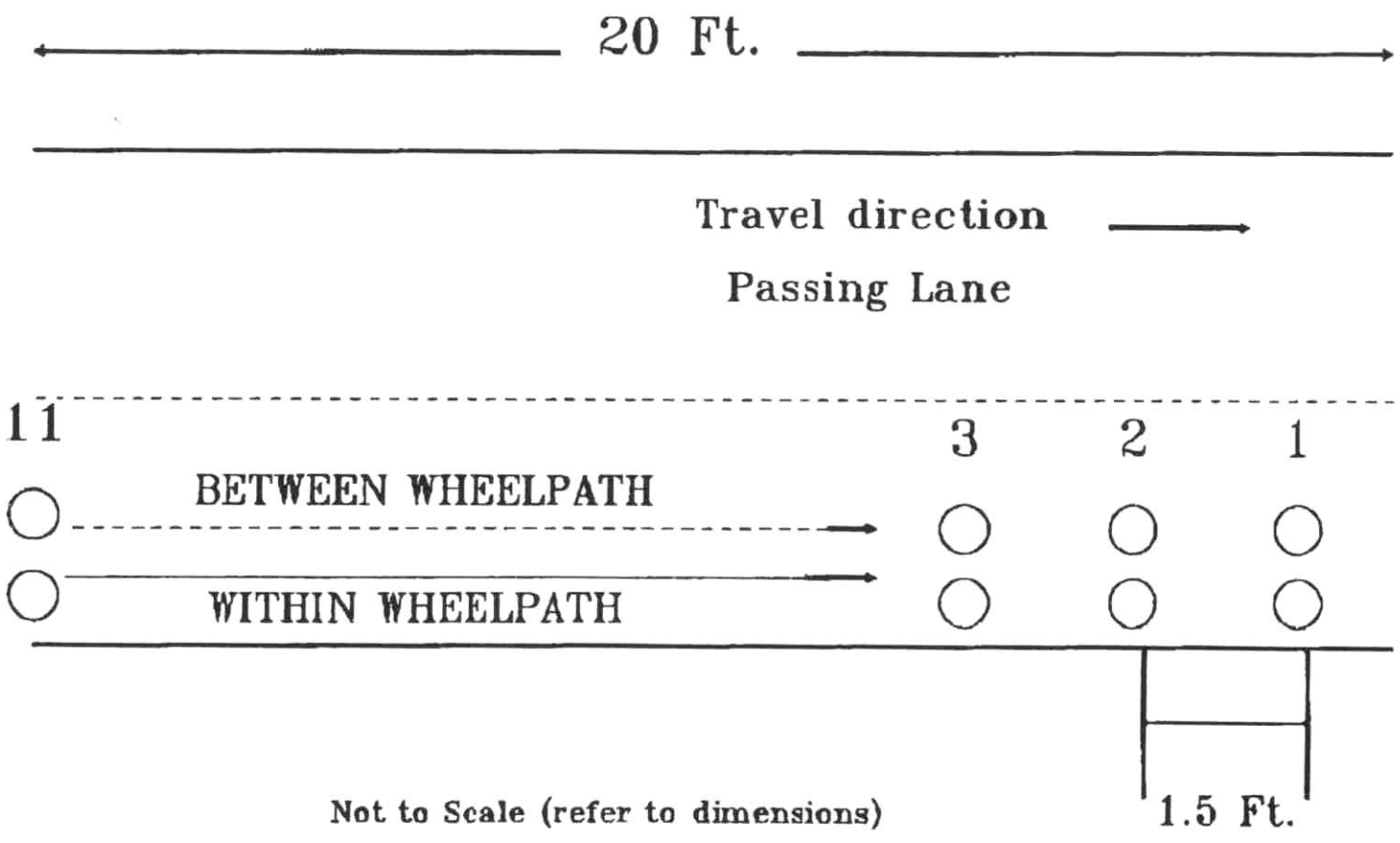


Fig. 2 Locations for Asphalt Concrete Cores

SPS-9 INDIANA

POST-CONSTRUCTION SAMPLING AND TESTING

ASPHALT TESTING

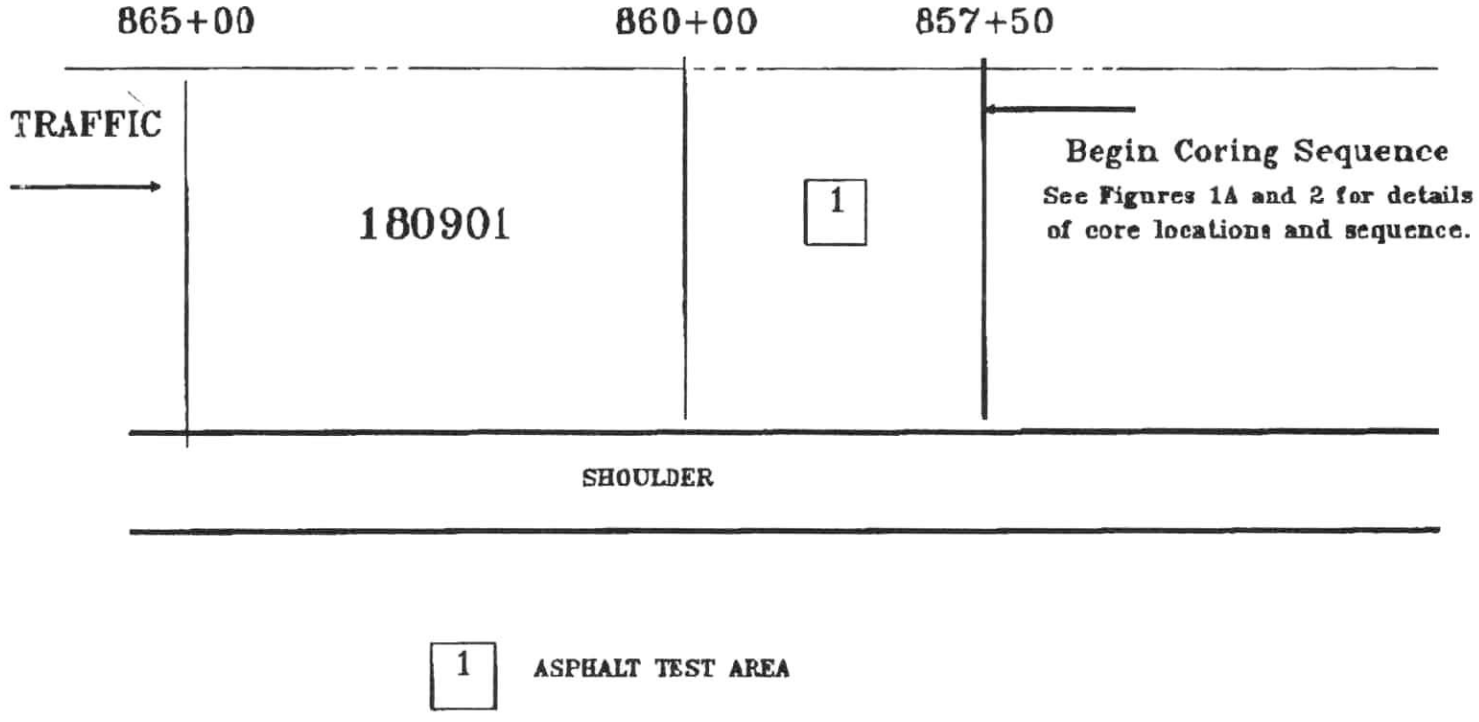


Figure 3. Sampling Plan for 180901

SPS-9 INDIANA

POST-CONSTRUCTION SAMPLING AND TESTING

ASPHALT TESTING

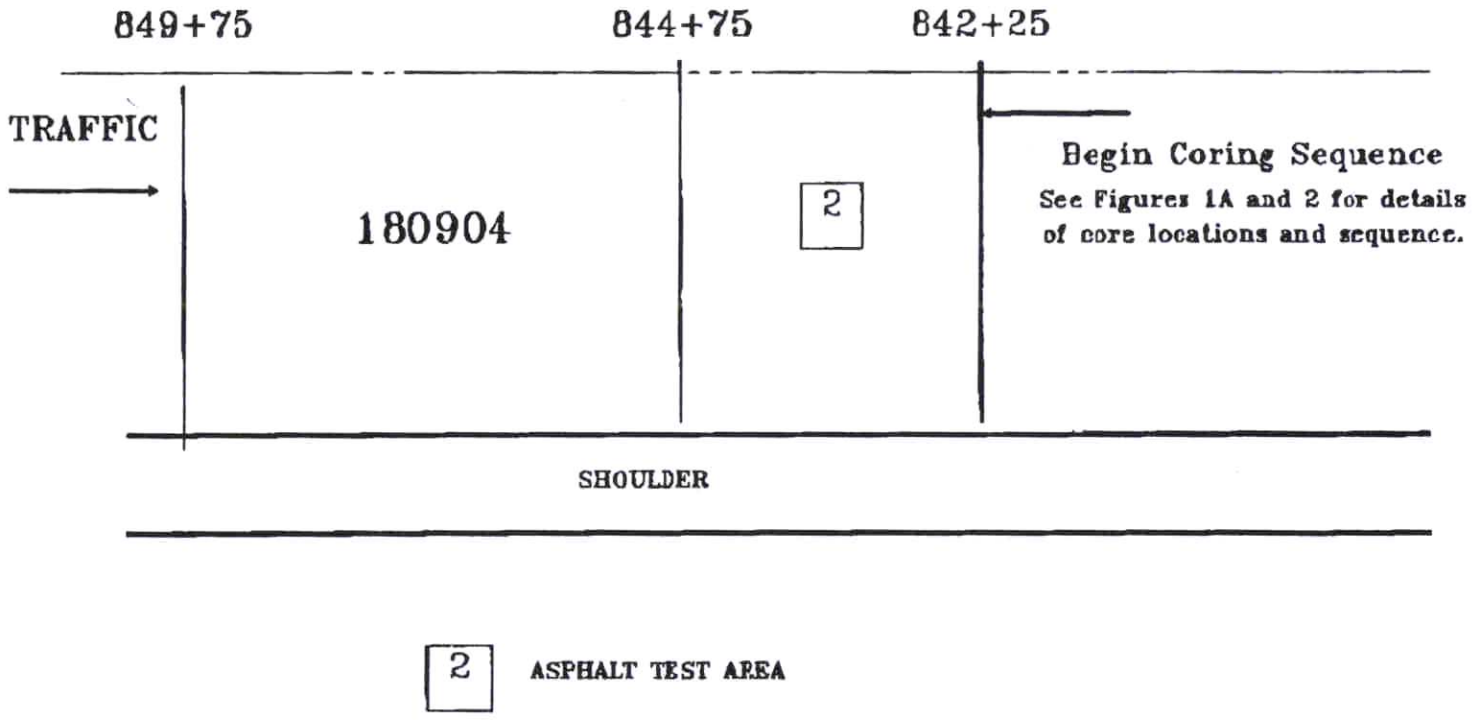


Figure 4. Sampling Plan for 180904

SPS-9 INDIANA

POST-CONSTRUCTION SAMPLING AND TESTING

ASPHALT TESTING

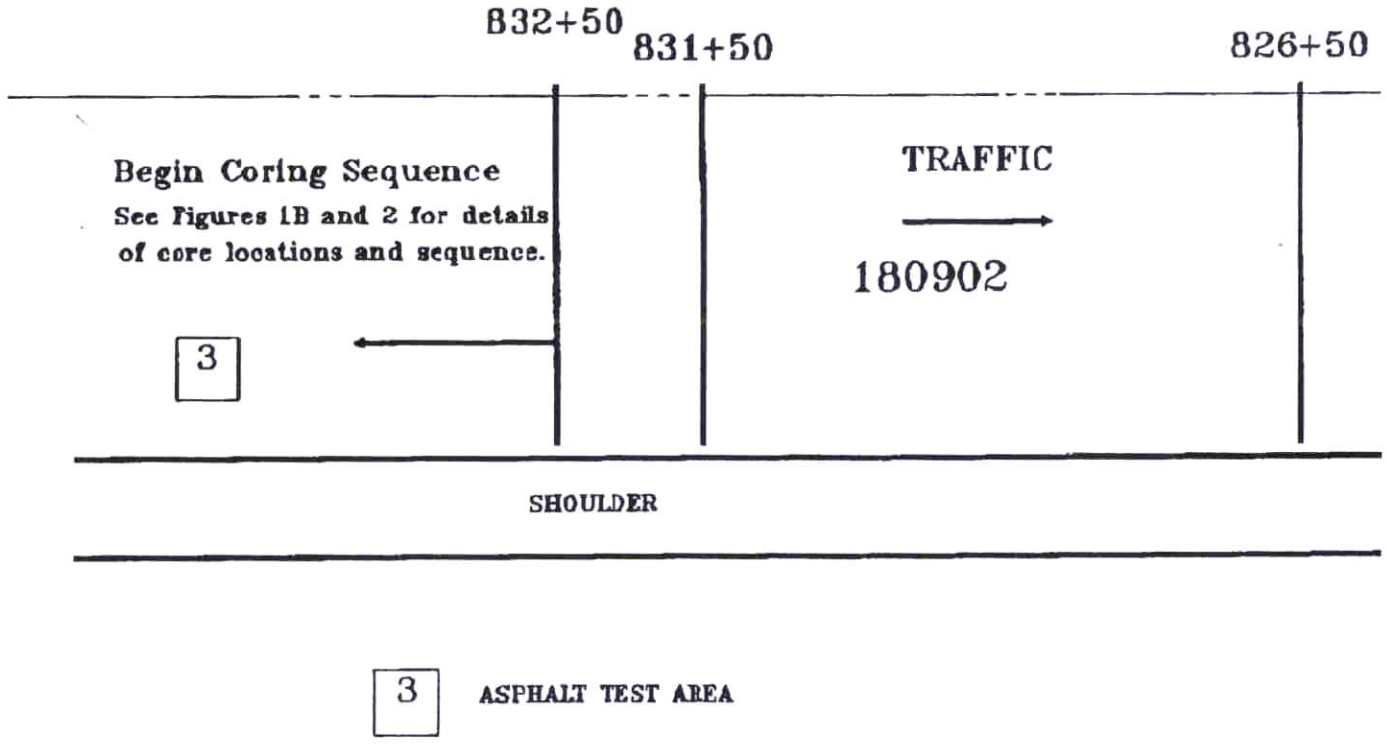


Figure 5. Sampling Plan for 180902

SPS-9 INDIANA

POST-CONSTRUCTION SAMPLING AND TESTING

ASPHALT TESTING

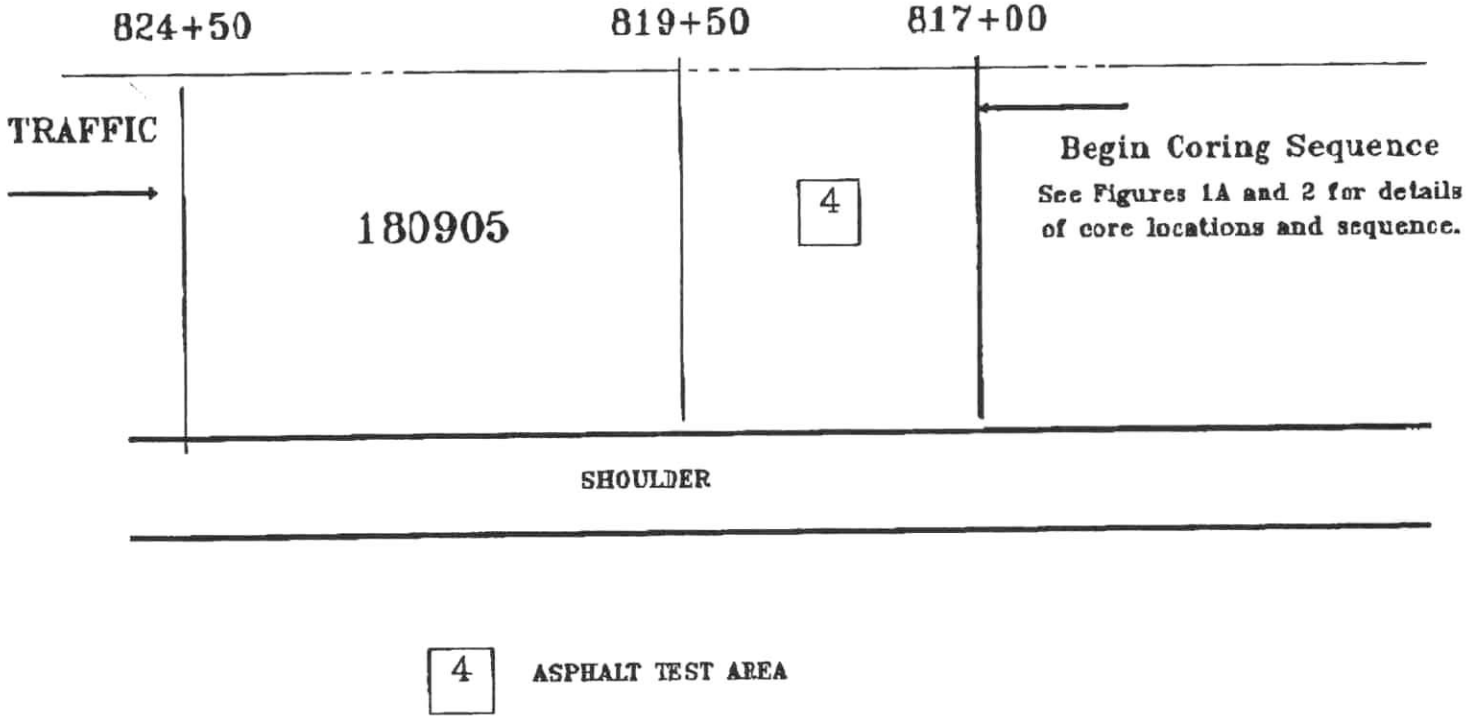


Figure 6. Sampling Plan for 180905

Attachment D

Layer Description and Thickness for Each Section

Table D-1. Layer description and thickness for each section.

Test Section	Layer Number	Material Code and Description	Average Layer Thickness (mm)
180901 SB	1	216 Subgrade-clayey sand, trace silt	N/A
	2	113 Embankment-sandy clay	508
	3	309 Subbase-silty clay trace gravel & sand, very stiff	622.3
	4	302-Base-sandy gravel (uncrushed)	152.4
	5	6 CRCP	241.3
	6	1 HMAC level	58.4
	7	1 HMAC binder	45.7
	8	1 HMAC surface (State)	30.5
180902 SB	1	202 Subgrade-fine to med.sand, trace silt	N/A
	2	113 Embankment-sandy clay	431.8
	3	302 Base-sandy gravel (uncrushed)	142.2
	4	6 CRCP	238.8
	5	1 HMAC level	76.2
	6	1 HMAC binder	40.6
	7	1 HMAC surface (SHRP AC & State Agg.)	25.4
180904 SB	1	216 Subgrade-clayey sand, trace silt	N/A
	2	113 Embankment-sandy clay	508
	3	309 Subbase-silty clay trace gravel & sand, very stiff	609.6
	4	302 Base-sandy gravel (uncrushed)	142.2
	5	6 CRCP	241.3
	6	1 HMAC level	76.2
	7	1 HMAC binder	35.6
	8	1 HMAC surface (SHRP)	27.9
180905 SB	1	202 Subgrade-fine to med.sand, trace silt	N/A
	2	309 Subbase-silty clay trace gravel & sand, very stiff	457.2
	3	302 Base-sandy gravel (uncrushed)	152.4
	4	6 CRCP	241.3
	5	1 HMAC level	66.0
	6	1 HMAC binder	43.2
	7	1 HMAC surface (SHRP)	27.9

Attachment E

Project Deviation Reports

LTPP SPS Project Deviation Report **Project Summary Sheet**	State Code 18 Project Code 0 9 0 0

Project Classification Information	
SPS Experiment Number: SPS-9	State or Province: Indiana
LTPP Region: ☐ North Atlantic ☒ North Central ☐ Southern ☐ Western	
Climate Zone: ☐ Dry-Freeze ☐ Dry-No Freeze ☒ Wet-Freeze ☐ Wet-No Freeze	
Subgrade Classification: ☐ Fine Grain ☒ Coarse Grain ☐ Active (SPS-8 Only)	
Project Experiment Classification Designation (SPS 1, 2, & 8): SPS-9	
Construction Start Date: April 1992	Construction End Date: Fall 1992
FHWA Incentive Funds Provided to Agency for this Project: ☒ Yes ☐ No	

Deviation Summary	
Site Location Deviations: ☐ No Deviations ☒ Minor Deviations ☐ Significant Deviations	
Construction Deviations: ☐ No Deviations ☐ Minor Deviations ☒ Significant Deviations	

Data Collection and Processing Status Summary	
Inventory Data (SPS 5,6,7, & 9): ☒ Complete Submission ☐ Incomplete ☐ Data Not Available	
Materials Data: ☐ All Scheduled Samples Obtained and Tested ☒ Incomplete	
Construction Data: ☒ All Required Data Obtained ☐ Incomplete / Missing Data Elements	
Historical Traffic Data: ☐ All Required Historical Estimates Submitted (SPS 5, 6, 7, & 9) ☐ Required Estimates Not Submitted	
Traffic Monitoring Equipment: ☒ WIM Installed On-Site ☐ AVC Installed On-Site ☐ ATR Installed On-Site ☐ No Equipment Installed	
Traffic Monitoring: ☐ Preferred ☒ Continuous ☐ Minimum ☐ Below Minimum ☐ Site Related	
Traffic Monitoring Data: ☒ Monitoring Data Submitted ☐ No Monitoring Data Submitted	
FWD Measurements: ☒ Pre-construction Tests Performed ☐ Construction Tests Performed ☒ Post-construction Tests Performed	
Profile Measurements: ☒ Pre-construction Tests Performed ☒ Post-construction Tests Performed	
Distress Measurements ☒ Pre-construction Tests Performed ☒ Post-construction Tests Performed	
Maintenance and Rehab. Data: ☒ Complete Submission ☐ Incomplete ☐ Data Not Available	
Friction Data: ☒ Complete Submission ☐ Incomplete ☐ Data Not Available	

Report Status	
Materials Sampling and Test Plan: ☒ Document Prepared ☒ Final Submitted To FHWA	
Construction Report: ☒ Document Prepared ☒ Final Submitted To FHWA	
AWS: (SPS 1, 2, & 8) ☐ AWS Installed ☐ AWS Installation Report Submitted to FHWA	

Page 1 of 5 Preparer Brenda B. Mehnert Date 6/23/03

LTPP SPS Project Deviation Report **Construction Guidelines Deviation**	State Code 18 Project Code 0 9 0 0

☒ Comments Pertain to All Test Sections on Project

☐ Comments Pertain Only to Section(s): (Specify) _____

Construction Guidelines Deviation Comments

No PG-Graded Binder sections were constructed. Only AC-20 asphalt was used for all sections.

LTPP SPS Project Deviation Report **Other Deviations**	State Code 1 8 Project Code 0 9 0 0

☒ Comments Pertain to All Test Sections on Project

☐ Comments Pertain Only to Section(s): (Specify) _____

Other Deviation Comments

None known.

Page 3 of 5 Preparer Brenda B. Mehnert Date 6/23/03

LTPP SPS Project Deviation Report **Data Collection and Materials Sampling and Testing Deviations**	State Code 1 8 Project Code 0 9 0 0

☒ Comments Pertain to All Test Sections on Project

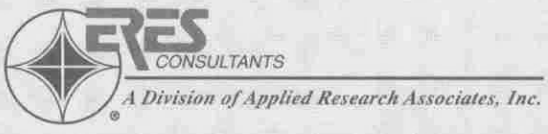
☐ Comments Pertain Only to Section(s): (Specify) _____

Data Collection & Material Sampling and Testing Deviation Comments

Incomplete material testing received from Agency and LTPP lab. The material testing data from the Agency is not in LTPP format and/or LTPP data sheets.

Page 5 of 5 Preparer Brenda B. Mehnert Date 6/23/03

Submitted by



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